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OS/VS Virtual Storage Access Method (VSAM) Options for Advanced Applications

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This technical newsletter, a part of Release 6 of OS/VS1 and Release 3.7 of OS/VS2, provides replacement pages for the subject publication. These replacement pages remain in effect for any subsequent releases unless specifically altered. Pages to be removed and inserted are:

Cover, edition notice

3, 4

7, 8

19-20.1 (20.1 added)

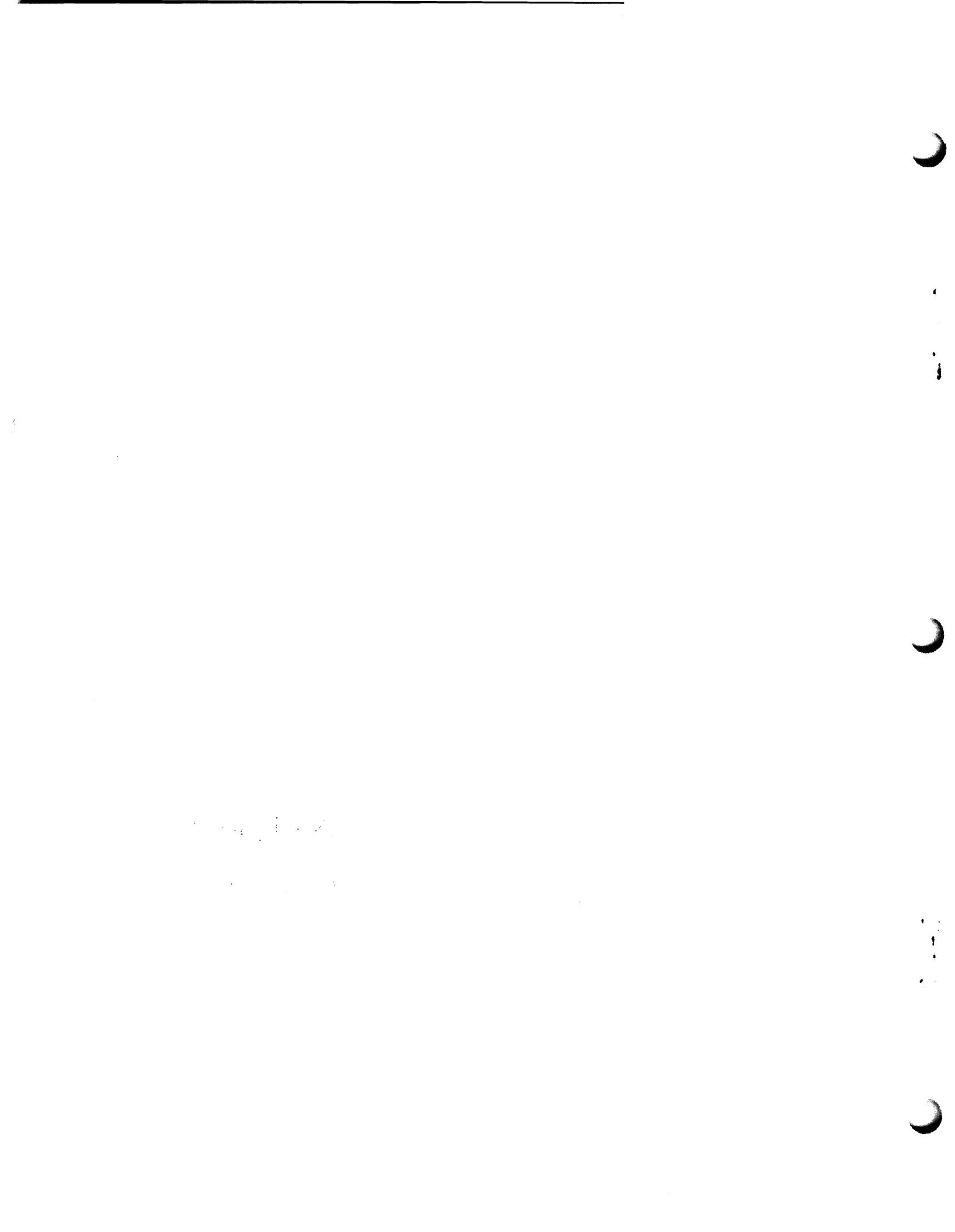
71, 72

Each technical change is marked by a vertical line to the left of the change.

Summary of Amendments

Control Blocks in Common (CBIC) option (MVS only), which allows a user to place the VSAM control blocks associated with a VSAM data set into the Common Service Area (CSA) of MVS.

Note: *Please file this cover letter at the back of the base publication to provide a record of changes.*



Systems

**OS/VS Virtual Storage
Access Method (VSAM)
Options for
Advanced Applications**

**VS1 Release 6
VS2 Release 3.7**

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Fourth Edition (January 1976)

This edition, as amended by technical newsletter GN26-0898, applies both to Release 6 of OS/VS1 and to Release 3.7 of OS/VS2, and to any subsequent releases of either system unless otherwise indicated in new editions or technical newsletters.

Significant system changes are summarized under "Summary of Amendments" following the list of figures. Each technical change is marked by a vertical line to the left of the change.

Information in this publication is subject to significant change. Any such changes will be published in new editions or technical newsletters. Before using the publication, consult the latest *IBM System/370 Bibliography*, GC20-0001, and the technical newsletters that amend the bibliography, to learn which editions and technical newsletters are applicable and current.

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HOW TO USE THIS PUBLICATION

This publication describes applications of VSAM (Virtual Storage Access Method) that might be effective in the development of utility programs and system control programs.

The chapters of this publication are:

- “Summary of Amendments,” which gives the changes to this publication for the releases of OS/VS1 and OS/VS2.
- “Processing Control Intervals,” which describes how to gain access to the whole contents of a control interval (rather than to individual data records) and how to manage your own I/O (input/output) buffers with control-interval access.
- “Sharing Resources among Data Sets,” which describes how to build a VSAM resource pool for sharing I/O buffers, I/O-related control blocks, and channel programs and how to manage buffers in a buffer pool.
- “Processing a VSAM Index,” which gives the format of a record in the index of a key-sequenced data set and explains how to gain access to an index using either the GETIX and PUTIX macros or the GET and PUT macros.
- “Processing a VSAM Catalog,” which describes how to gain access to a VSAM catalog as a catalog, by way of the SHOWCAT macro, and as a data set, by way of the GET and PUT macros.
- “Building Parameter Lists for GENCB, MODCB, SHOWCB, and TESTCB,” which gives the format of the parameter lists used by GENCB, MODCB, SHOWCB, and TESTCB and explains how to build a parameter list to generate, modify, display, or test an access-method control block, exit list, or request parameter list.
- “Appendix: Operand Notation for the Macros,” which describes list and execute forms of the macros presented in this publication and expressions that can be used to code the operands of each macro.

This publication also has:

- “Glossary,” which defines technical terms used in this publication.
- “Index,” which identifies the pages on which the subjects of this publication are discussed.

The formats of the control information in a control interval, of a VSAM index record, and of the macros for building parameter lists for GENCB, MODCB, SHOWCB, and TESTCB are subject to change. The publication of this information implies no commitment on the part of IBM to maintain these formats in future releases.

Conventions Used in the Publication

The conventions used in this publication for presenting the formats of macros indicate whether an operand is optional, how to specify the value for an operand, and how to punctuate a macro. The conventions are:

- Expressions enclosed in brackets, [], are optional.
- Items separated by an OR sign, |, are alternatives, only one of which may be specified. The alternatives are enclosed in braces, { }.
- An underlined **item** is the default when you don't specify anything for an operand.
- Ellipses, ..., indicate either that you may repeat the preceding item or that other items, not relevant to the discussion, are omitted.
- Capitalized **BOLD** expressions, parentheses, commas, and equal signs must be entered as shown, except that, unless otherwise noted, parentheses aren't required if you specify only one item.
- Lowercase *italic* expressions are variables for which you may specify one of a number of expressions.

Required Publications

The *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3838, is recommended for learning about VSAM data sets and the macros you use to gain access to them. Rather than repeat information from the *VSAM Programmer's Guide*, this publication assumes you are familiar with the *VSAM Programmer's Guide*. This publication discusses the operands of some of the macros described in that publication and some of the return codes from those macros, but it relies on that publication for a full presentation of the macros and return codes.

Related Publications

The following publications are referred to for additional information about particular subjects:

OS/VS Publication

- *OS/VS1 Checkpoint/Restart*, GC26-3876, and *OS/VS2 MVS Checkpoint/Restart*, GC26-3877, for information about the use of checkpoint/restart with a VSAM data set.

OS/VS1 Publications

- *OS/VS1 Access Method Services*, GC26-3840, for information about the commands used to process a catalog as a catalog.
- *OS/VS1 Virtual Storage Access Method (VSAM) Logic*, SY26-3841, for information about the format and arrangement of records in a VSAM catalog.

OS/VS2 Publications

- *OS/VS2 Access Method Services*, GC26-3841, for information about the commands used to process a catalog as a catalog.
- *OS/VS2 Catalog Management Logic*, SY26-3826, for information about the format and arrangement of records in a VSAM catalog.

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Its CPU (central processing unit) processing is faster than that of normal control-interval access. In OS/VS2 a processing program can achieve the best performance with improved control-interval access by combining it with SRB dispatching. (SRB dispatching is described in *OS/VS2 System Programming Library: Supervisor.*)

To open an object for improved control-interval access, the named object must:

- Be an entry-sequenced or relative record cluster; the data component of a key-sequenced, entry-sequenced, or relative record cluster; or the index component of a key-sequenced cluster (index records must not be replicated).
- Have control intervals the same size as physical records. When you use Access Method Services DEFINE to define the object, you can specify control-interval size equal to a physical-record size used for the device on which the object is stored. VSAM uses physical-record sizes of 512, 1024, 2048, and 4096 bytes. (4096 is not used, however, for the IBM 2314 Direct Access Storage Facility.)
- Not be empty.

If these restrictions aren't met, the object can't be opened.

To process a data set with improved control-interval access, a request must be:

- Defined by a single RPL (no chained request parameter lists). VSAM ignores the NXTRPL operand.
- A direct GET, GET for update, or PUT for update (no POINT, no processing empty data sets—a relative record data set with slots formatted is considered not to be empty, even if no slot contains a record).
- Synchronous (no CHECK, no ENDREQ).

With improved control-interval access, VSAM assumes (without checking) that an RPL whose ACB has MACFR=ICI has OPTCD=(CNV, DIR, SYN) that a PUT is for update (OPTCD=UPD), and that your buffer length (specified in RPL AREALEN=*number*) is correct. Since VSAM does not check these operands, you should debug your program with ACB MACRF=NCI, then change to ICI.

With improved control-interval access, VSAM doesn't take JRNAD exits and doesn't keep statistics (which are normally available by way of SHOWCB from the access-method control block).

With improved control-interval access, you may specify that control blocks are to be fixed in real storage (ACB MACRF=(CFX,...)). If you so specify, your I/O buffers must also be fixed in real storage. Having your control blocks fixed in real storage, but not your I/O buffers, may cause physical errors or unpredictable results. If you specify MACRF=CFX without ICI, VSAM ignores CFX. NFX is the default—it indicates that buffers are not fixed in real storage, except for an I/O operation. A program must be authorized to fix pages in real storage—either in supervisor state with protection key 0 or 7, or link-edited with authorization. (The authorized program facility is described in *OS/VS2 System Programming Library: Supervisor.*) An unauthorized request is ignored.

CBIC (Control Blocks in Common) Option (MVS Only)

The CBIC option places the VSAM control blocks associated with a VSAM data set into the common service area (CSA) of MVS. When you open the VSAM data set with the CBIC option, you must be in supervisor state with a protection key from 0 to 7. If this is not the case, the open will fail. The control block structure and VSAM I/O support are essentially the same with CBIC as without except for the location of the control block structure. The user-related control blocks are generated in the protection key of the user (from 0 to 7). The system-related control blocks are generated in key 0. The VSAM control block structure generated with the CBIC option retains normal control block structure connections to the region which opened the VSAM data set (such as the DEB chained to the region's TCB, etc.).

The CBIC option is invoked when a VSAM data set is opened. To invoke this option, you must set the CBIC in the ACB to one prior to OPEN. The CBIC bit is located at offset X'33' (ACBINFL2) in the ACB, bit 2 (ACBCBIC).

The CBIC option may be used only with the ICI option. The following restrictions apply when using the CBIC option:

- CBIC cannot be used with LSR or GSR specified.
- The catalog, user, or system CRA, VVIC (Virtual Volume Inventory Control), swap, or system data sets cannot be used with the CBIC option.
- A VSAM checkpoint is not allowed if CBIC data sets are being used in a region.

If another region accesses the data set's control block structure in the CSA through VSAM record management, the following conditions should be observed:

- An open must only be issued against the data set from the first region.
- The ACB of the user who opened the data set with the CBIC option must be used.
- CLOSE and CLOSE (TYPE=T) cannot be issued for the data set (only the user who opened the data set with the CBIC option can close the data set).
- A region must have the same storage protect key as the user who opened the data set with the CBIC option.
- User exit routines should be accessible from all regions accessing the data set with the CBIC option.

Error Return Codes

Some of the error return codes described in the *VSAM Programmer's Guide* have other meanings for control-interval access.

Return Codes from OPEN

One return code from OPEN in the ERROR field in the ACB has additional meanings for control-interval access:

ERROR	
Code	Meaning
160(A0)	The operands specified in the ACB (or GENCB) macro are inconsistent with each other or with information in the catalog. Inconsistencies include: <ul style="list-style-type: none">• MACRF=ICI or UBF is specified along with LSR or GSR.• MACRF=ICI is specified, but control-interval size for the component doesn't equal physical-record size or the object to be opened is a key-sequenced cluster or an index component with record replication.
224(E0)	MACRF=ICI is specified, but the data set is empty.

Logical-Error Return Codes

Some logical-error return codes have additional meanings for control-interval access, and some apply only to control-interval access:

FDBK	
Code	Meaning
76(4C)	A key-sequenced or relative record data set cannot be extended by way of control-interval access.
80(50)	ERASE is invalid for control-interval access.
84(54)	OPTCD=LOC is inconsistent with MACRF=UBF.
104(68)	The RPL options are either invalid or inconsistent: <ul style="list-style-type: none">• OPTCD=CNV is specified along with BWD.• With MACRF=ICI, OPTCD=(CNV, DIR, SYN) must be specified.• With MACRF=ICI, PUT with OPTCD=NUP is invalid.• With MACRF=ICI, POINT, CHECK and ENDREQ are invalid.
200(C8)	Control-interval access is not allowed for processing by way of a path.

Physical-Error Return Codes

For physical errors, the RBA field in the request parameter list gives the relative byte address of the control interval in relation to which the physical error occurred.



INDEX

For additional information about any subject listed in this index, refer to the publications that are listed under the same subject in either *OS/VS1 Master Index*, GC24-5104, or *OS/VS2 Master Index*, GC28-0693.

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